Friday Flyer – December 7, 2012
Something to share—an interesting research project or kudos for a student, teacher or mentor? Contact Kris Whelan.

Center Spotlight: University of California - Riverside: http://faculty.ucr.edu/~ellison/Quarknet/

UCR in the News: http://ucrtoday.ucr.edu/7736

Contact John Ellison for tips on how to rejuvenate an inactive center and unique ways to link teachers and students studying cosmic rays.

In 2004, University of California, Riverside wanted to bring back QuarkNet. The original mentor had left the university, leaving the Inland Empire without the leadership it needed to thrive. Enter John Ellison, Robert Clare, Stephen Wimpenny and local physics teacher, Mark Bonnard. Currently UCR has a very strong core group of teachers and physicists. During FY12, UCR held a particle physics masterclass and hosted a summer teacher workshop.

Students from three high schools attended the masterclass. There were actually more applicants than "slots" for this amazing experience, and UCR had to turn away 20 students. They had learned that under most conditions, it is best to limit the number of students. During the masterclass day, Drs. Simani, Long, Clare, and Gary gave introductory lectures on particle physics, detectors, CMS and how to do the event analysis. The following morning the students returned to UCR to participate in a videoconference with CERN moderators. Besides UCR, high school classes from Portugal, France, and Slovakia participated in the videoconference. Students compared results and asked questions, both of the moderators and European students.

Check out this unique way of networking teachers and students studying cosmic rays. UCR has six cosmic ray detectors in schools, and nine teachers attended a three-day workshop in July. During this academic year, the teachers are guiding student projects. They will also have discussions and comparisons of results among the schools via videoconference hookups among the schools and UCR. The most experienced teacher, Mark Bonnard (San Jacinto High School), is the "lead teacher," helping with coordination and answering questions from other schools. Due to the low physics teacher density in area high schools, several teachers live up to several hours from UCR. The center has overcome that difficulty by holding periodic videoconferences among teachers, students and physicists. In fact, whenever UCR receives a detector, the teachers also receive a webcam and microphone if they do not already have one. This enables teachers and students to rely on each other for troubleshooting. For example, one UCR teacher connected with a teacher near Lake Placid, New York. The New York students helped the UCR students analyze and fix the problem. There was authentic collaboration between teachers, students and mentors. This mirrors the nature of HEP collaborations throughout the world.

News from QuarkNet Central: Physics education program QuarkNet develops global reach
http://www.symmetrymagazine.org/article/november-2012/physics-education-program-quarknet-develops-global-reach
A professional development program created in the United States to help teachers explain particle physics has caught on across the world. (from *symmetry* magazine)

Higgs Matters: http://www.nytimes.com/2012/11/30/opinion/global/kathy-sykes-higgs-matters.html?pagewanted=1&_r=0
Do your students ask why we spent so much time and money studying particles that we can't see? When the Superconducting Super Collider was canceled, there was no public outcry because people had no idea what the fuss was all about. We, as educators, owe it to our students and

ourselves to make sure that doesn't happen again. (from Kathy Sykes, *The New York Times*, November 30, 2012)

QuarkNet and the International Particle Physics Community: http://ippog.web.cern.ch/content/2011/about-ippog
QuarkNet PI and spokesperson **Marge Bardeen** has been elected co-chair of the International Particle Physics Outreach Group (IPPOG). IPPOG is a network of scientists, informal science educators and communication specialists working across the globe in informal science education and outreach for particle physics. Membership currently includes representatives from each member state of CERN, four major experiments at CERN's Large Hadron Collider (LHC) and prominent labs and institutions in the USA and Europe.

Physics Experiment Roundup: **Long Baseline Neutrino Experiment**
http://lbne.fnal.gov
"Neutrinos, astonishingly abundant yet not well understood, may provide the key to answering some of the most fundamental questions about the nature of our universe"
(from lbne.fnal.gov). Learn about the experiment stretching from Fermilab to the Homesteak Mine in South Dakota that will look at how and why neutrinos behave the way they do.

Just for Fun: Particles of the Day
http://www.quantumdiaries.org/2012/11/20/particles-of-the-day/
Check out Seth Zenz, postdoctoral researcher working for Princeton University on the CMS experiment. Each day he features a new particle on Twitter; Seth is @sethzenz, and the hashtag will be #ParticleOfTheDay. Start class each day checking out his posts. Might be a good bell-ringer! It will introduce students to the vast number of particles that exist.

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